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GEOLOGICAL NOTES. — *General.*—The age of the formations around Keff, in Tunis, has been determined by M. Maris by the aid of the fossils. There is a regular superposition of upper cretaceous, eocene and miocene. The middle eocene, or nummulitic beds, rest directly upon the Senonian or chalk, without the interposition of a lower eocene. The uppermost part of the cretaceous is very rich in fossils, especially in small echini related to Faujasia, and may belong to the Darian stage. The most interesting of the lower beds are those which enclose *Heterocerus polyplocum*, and correspond to the upper Senonian beds of Tercis, in Westphalia, and to the chalk of Meddon.

*Tertiary.*—M. Dieulafait's conclusions regarding the origin of the phosphorites and ferruginous clays of France are as follows:

(1) The quantity of phosphate of lime existing in the caverns of the south-west of France does not represent a tenth part of that which existed in the limestones, the removal of which produced the caverns.

(2) The ferruginous clays, which accompany and often cover the phosphates, have the same composition as those which are obtained by attacking with a feeble oxydating acid, the rocks constituting the walls of the phosphorite caverns.

(3) Rare substances, such as manganese, nickel, cobalt, zinc, copper, and iodine, which exist in the normal rocks of the phosphorite districts, are found in a relative state of concentration in the phosphorites and in their accompanying clays.

These results point to the possibility that the phosphorites of the calcareous plateaux of the south-west of France have, for the most part, if not entirely, been extracted from the encasing rocks, solely by the influence of the chemical reactions of the humid method.

## MINERALOGY.[1]

ALLANITE, APATITE AND TYSONITE CRYSTALS.—Professor E. S. Dana[2] has given careful crystallographic descriptions of allanite from Moriah, N. Y., apatite from Paris, Me., and tysonite from Colorado. The crystal of allanite was remarkable both for size and perfection, measuring 3¾ by 4½ inches, having smooth planes and being of a symmetrical shape.

The apatite crystal, of a deep blue color, was small (¼ inch in length), but beautifully modified. It was doubly terminated by pyramids of the third order, these hemihedral forms being unusually prominent. Two new planes for the species were ascertained.

The crystal of tysonite was the largest yet found, weighing fully two and a half pounds. Only a few planes were observed, but the angle between O and 1, which was regarded as the fundamental angle, was determined to be $O \wedge 1, 0001 \wedge 1011 = 38°25'$ and $38°24\frac{1}{2}'$. The length of the vertical axis is then $c = 0.68681$, and from this the other angles are calculated.

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[1] Edited by Professor H. CARVILL LEWIS, Academy of Natural Sciences, Philadelphia, to whom communications, papers for review, etc., should be sent.

[2] *Amer. Journ. Sc.*, 1884.

Curious Gold Crystals.—W. P. Blake[1] has described some curious forms of crystallized gold from Montana. There is a solid octahedral nucleus or head, with a long divergent brush-like appendage on one side, resembling the drawings made of certain comets. The appendages are many times longer than the octahedron, but the whole crystal is not over an eighth of an inch in length.

He also describes hexagonal prisms of gold, terminated at one or both ends with pyramids. The planes are brilliant and the crystals show no signs of twinning. They are from Sonora, California.

Alkalies in Beryl—S. L. Penfield has shown that, so far as he has tested, all beryl contains more or less alkalies, sodium and lithium being always present, and sometimes cæsium. Water is also always present, and must be regarded in the formula. The alkalies, sometimes amounting to five per cent, are shown to replace the beryllium, and the formula $Al_4 Be_5 H_2 Si_{11} O_{34}$ is proposed as the one agreeing best with the analyses.

New Mineral Analyses.—F. W. Clark and T. M. Chatard, in the laboratory of the U. S. Geological Survey, have published[2] new analyses of the following minerals: (1) Jade and pectolite, from Point Barrow, Alaska, which are cut and polished by the Eskimo; (2) saussurite, from Shasta county, California; (3) allanite, from Topsham, Maine, where it occurs in slender black prisms, often rusty on the surface, and known by the quarrymen as "nails"; (4) damourite, from the topaz locality of Stoneham, Maine, both compact and micaceous; (5) margarite, from Gainesville, Ga., one specimen being of a bright pistachio green color, contrasting with the core of pink corundum, from which it radiates; (6) cimolite (?), a pink, earthy alteration product, encrusting albite and tourmaline, from Norway, Maine; (7) halloysite, in bluish white lumps, covered with a black coating of the oxides of copper and manganese, from near Mono Lake, California; (8) prochlorite, from Georgetown, D. C., of a dark green color; (9) halotrichite, occurring among a deposit of aluminous sulphates, which cover some two thousand acres at the headwaters of the Gila river, New Mexico; (10) alunogen, in variously colored crusts, from the same locality. New localities for several other minerals are also given.

Löllingite and other Minerals from Colorado.—At several mines in Gunnison county, Colorado, associated with barite, sid-

[1] *Amer. Journ. Sc.*, 1884.

[2] *Ibid.*

esite, galena, chalcopyrite, argentite, proustite, etc., there occur small, steel-like crystalline forms of radiated structure, often stellate, which have been shown by W. F. Hillebrand[1] to be a cobaltiferous variety of löllingite, an arsenide of iron. The crystals are often interpenetrated, and form twins and trillings, which again interpenetrate to form complex radiating masses, often several inches in diameter. The specific gravity is 7.4, and analysis showed the presence of over four per cent of cobalt, with small percentages of nickel, copper, bismuth and sulphur.

A related mineral, which occurred in thin blades with the löllingite, was shown to be an arsenite of cobalt, but not enough was obtained for analysis.

Cosalite was found in La Plata county in irregular masses of small size, having irregular fracture, a grayish-white color, and hardness of 3.5.

A sulpho-bismuthite of copper and silver, probably a new mineral, was found in a quartz vein in Park county. It was a bluish-gray substance, sometimes occurring in minute, slender, striated crystals. It will receive further investigation.

Hübnerite occurs in Ouray county in large flattened crystals, vertically striated and imbedded in quartz. It has a brownish-black color, pale yellow in very thin crystals. The composition agrees with the formula, $MnWO_4$.

EVANSITE.—The rare mineral *evansite*, a hydrous phosphate of alumina, heretofore found only in Hungary, whence it was brought in 1856 by Brooke Evans, after whom D. Forbes named the species, has recently been found by A. S. Woodward[2] in East Cheshire, England. It occurs in fissures in a fossiliferous shale, and it is probable that like the vivianite of the New Jersey greensand beds, it is in part derived from organic matter. In physical characters the mineral agrees with the original evansite.

TIN FROM NORTH CAROLINA.—In a recent number of the NATURALIST reference was made to the discovery of tin at King's mountain, N. C. Dr. C. W. Dabney, Jr., has sent us further particulars concerning its occurrence at that place.

The cassiterite is mostly massive or crypto-crystalline; specific gravity 6.6–6.9; color generally dark brown, but varying from black to almost colorless.

The partial composition was ascertained to be as follows:

| | (1) | (2) |
|---|---|---|
| Silica | 1.76 | 2.36 |
| Arsenic | .... | trace |
| Sulphur | trace | 0.46 |
| Tungstic acid | 0.92 | 1.14 |
| Tin | 74.41 (by wet method) | 65.21 (by fusion) |
| Iron and manganese | undetermined | undetermined |

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[1] *Amer. Journ. Sc.*, 1884.

[2] *Mineralogical Magazine*, Vol. v, p. 333.

Specimen (1) was of a light grayish color, specimen (2) was dark brown.

Associated with the cassiterite is tourmaline, menaccanite, mica, zircon and rutile, the two latter scarce. Much of the cassiterite is in small grains with tourmaline.

NICKEL FROM NEVADA.—Important deposits of nickel ore have been discovered in Churchill county, Nevada. Some thirteen veins, varying in width from ten to thirty-five inches, traverse a ledge of rock, the gangue separating the veins consisting of silica, iron, lime and magnesia. As recently determined by S. B. Newberry[1], the ore at the greatest depth (eighty feet) consists of nearly pure niccolite. Nearer the surface oxidation products appear. At the ten feet level the ore is mainly the hydrated arseniate, or annabergite. There is every prospect that the nickel mines of Nevada will eventually become a prominent source of supply of this valuable metal.

VANADINITE.—Vanadinite in brilliant red and yellow hexagonal crystals is reported by F. H. Blake[2] as occurring in Pinal county, Arizona. Wulfenite occurs at the same locality. The vanadinite occurs in the seams of a partly decomposed rock resembling trap, covering sometimes five square inches of surface. The crystals are small and are generally simple hexagonal prisms whose prismatic planes are striated vertically, the opposite of what occurs in pyromorphite. Some few modifications also occur.

## BOTANY.[3]

STRUCTURE, DEVELOPMENT AND DISTRIBUTION OF STOMATA IN EQUISETUM ARVENSE.[4]—The stomata develop less rapidly on the stem than on the leaves, and hence in order to study them in their earlier stages, it is best to cut a section of epidermis from a very young stem.

In the earliest stages I could find, the mother-cell of the stoma occurred as a cell of equal rank with the others, but was divided into four guard cells lying side by side, their longitudinal axes being parallel to that of the stem (Fig. 1 *a*). As the ordinary epidermal cells develop they grow more in length than in breadth, while the stomata grow equally in both directions, and crowd upon the surrounding cells (Figs. 1 and 3). In the meantime the outer pair of guard cells arch over the inner pair (Fig. 1 *b*) and finally completely cover them (Fig. 3). When mature, the guard cells are loaded with silica arranged in radiating bars (Fig. 3), and usually the inner pair is entirely hidden; but if a thin cross-

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[1] *Amer. Journ. Sc.*, 1884.

[2] *Ibid.*

[3] Edited by PROF. C. E. BESSEY, Ames, Iowa.

[4] Selected for publication from original work of students in the botanical laboratory of the University of Michigan, 1883-'84.